

ABSTRACT OF THE DISCLOSURE

A nanomachining method for producing high-aspect ratio precise nanostructures.

The method begins by irradiating a wafer with an energetic charged-particle beam.

Next, a layer of patterning material is deposited on one side of the wafer and a layer of

5 etch stop or metal plating base is coated on the other side of the wafer. A desired pattern is generated in the patterning material on the top surface of the irradiated wafer using conventional electron-beam lithography techniques. Lastly, the wafer is placed in an appropriate chemical solution that produces a directional etch of the wafer only in the area from which the resist has been removed by the patterning process. The high mechanical strength of the wafer materials compared to the organic resists used in conventional lithography techniques with allows the transfer of the precise patterns into structures with aspect ratios much larger than those previously achievable.